

ABSTRACT

An apparatus is directed to controlling a light source. The apparatus provides at least one light source that emits a light signal at a discrete frequency and a reference signal at the discrete frequency. The apparatus further includes a photodetector optically coupled to the light source and designed to receive the light signal. The apparatus additionally includes at least one lock-in system coupled to the photodetector and each light source that receives the light signal from the photodetector and receives the reference signal from the light source. Each lock-in system produces an intensity value of the light source based on the light signal and the reference signal. The lock-in system may include a frequency multiplier and a filter coupled to the frequency multiplier wherein the intensity value is the product of the light signal and the reference signal processed through the frequency multiplier, and filtered to remove non-dc portions.